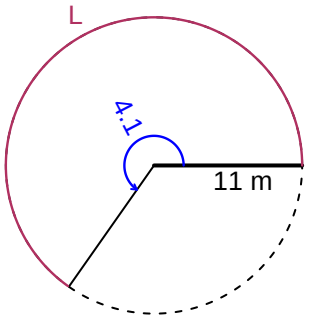
Name: Date:

Trig Final (Solution v25)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 11 meters. The angle measure is 4.1 radians. How long is the arc in meters?

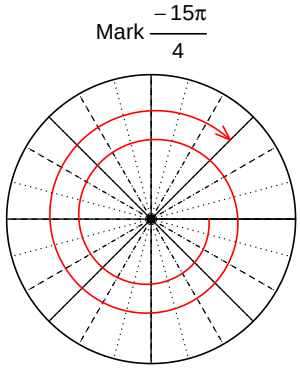


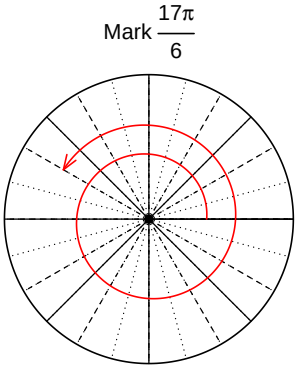
$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

$L = 45.1$ meters.

Question 2

Consider angles $\frac{-15\pi}{4}$ and $\frac{17\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-15\pi}{4}\right)$ and $\sin\left(\frac{17\pi}{6}\right)$ by using a unit circle (provided separately).





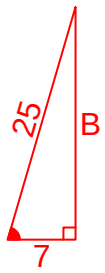
$\cos(-15\pi/4) = \frac{\sqrt{2}}{2}$

$\sin(17\pi/6) = \frac{1}{2}$

Question 3

If $\cos(\theta) = \frac{-7}{25}$, and θ is in quadrant II, determine an exact value for $\tan(\theta)$.

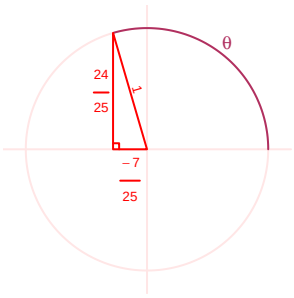
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$7^2 + B^2 = 25^2$$
$$B = \sqrt{25^2 - 7^2}$$
$$B = 24$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\tan(\theta) = \frac{\frac{24}{25}}{\frac{-7}{25}} = \frac{-24}{7}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 7.11 meters, a frequency of 2.28 Hz, and a midline at $y = -5.16$ meters. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -7.11\cos(2\pi 2.28t) - 5.16$$

or

$$y = -7.11\cos(4.56\pi t) - 5.16$$

or

$$y = -7.11\cos(14.33t) - 5.16$$